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MEMBER OF EOTA



European Technical Assessment ETA-21/0360 of 2021/06/25

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:

LIGNO acoustic panels

Product family to which the above construction product belongs:

Cross laminated timber element

Manufacturer:

LIGNOTREND GmbH & Co. KG
Landstrasse 25
DE-79809 Weilheim-Bannholz
Telephone 49 (0) 77 55 / 92 00-0
Internet www.lignotrend.com

Manufacturing plant:

LIGNOTREND Produktions GmbH
Landstrasse 25
DE-79809 Weilheim-Bannholz

This European Technical Assessment contains:

14 pages including 5 annexes which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:

EAD 130005-00-0304 - Solid wood slab element for use as structural element in buildings

This version replaces:

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II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

LIGNO acoustic panels is a cross laminated timber element made of softwood consisting of 3 - 6 layers. The elements are plane.

Individual layers consist of parallel oriented lamellae made of strength graded boards. The boards may be resawn during the production process resulting in boards or strips with smaller widths.

The components and the system setup of the product are given in Annex 1, Figure 1 and Figure 2.

The application of chemical substances (wood preservatives and flame retardants) is not subject of the European technical assessment.

Wood species are softwoods spruce, fir, pine, larch and Douglas fir.

2 Specification of the intended use in accordance with the applicable EAD

The cross laminated timber is intended to be used as a structural or non-structural element in buildings and timber structures. The cross laminated timber shall be subjected to static and quasi static actions only.

The cross laminated timber is intended to be used in service classes 1 and 2 according to EN 1995-1-1. Members which are directly exposed to the weather shall be provided with an effective protection for the cross laminated timber element in service.

The performances given in Section 3 are only valid if the cross laminated timber elements are used in compliance with the specifications and conditions given in Annex 1 to 5.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the cross laminated timber element of at least 50 years.

The real working life may be, in normal conditions, considerably longer without major degradation affecting the essential requirements of the works.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability (BWR1)¹⁾	
Bending ²⁾	Annex 3
Tension and compression ²⁾	Annex 3
Shear ²⁾	Annex 3
Embedment strength	Annex 3
Creep and duration of the load	Annex 3
Dimensional stability	Annex 3
In-service environment	Annex 3
Bond integrity	Annex 3
3.2 Safety in case of fire (BWR2)	
Reaction to fire	Annex 3
Resistance to fire	Annex 3
3.3 Hygiene, health and the environment (BWR3)	
Influence on air quality	<p>The manufacturer has submitted a written declaration that no dangerous substances > 0.1 wt. % are used in the product assessed by the present ETA.</p> <p>Only wood-based panels which can be assigned to formaldehyde class E1 according to EN 13986 shall be used. The use of wood preservatives and flame retardants is excluded.</p> <p>The chemical composition of the adhesives for gluing the boards and the finger joints of the individual boards has to be in compliance with the chemical composition deposited at ETA Danmark A/S.</p>
Water vapour permeability – Water vapour transmission	No performance assessed
3.4 Safety in use (BWR4)	
Impact resistance	Annex 3
3.5 Protection against noise (BWR5)	No performance assessed
3.6 Energy economy and heat retention (BWR6)	No performance assessed

1) This characteristic also relates to BWR 4

2) Load bearing capacity and stiffness regarding mechanical actions perpendicular to and in plane of the cross laminated timber element.

3.7 Manufacturing

The cross laminated timber elements are manufactured in accordance with the provisions of this European technical assessment using the automated manufacturing process in accordance with the technical documentation.

The layers shall be bonded together to the required thickness of the cross laminated timber.

Specifications of the used boards are given in Annex 2. Boards are visually or machine strength graded. Only technically dried wood shall be used.

The boards or the basic elements may be connected by finger joints in longitudinal direction according to EN 14080. There shall be no butt joints.

The cross laminated timber elements correspond to the specifications given in Annexes 1 to 3 of this European technical assessment. The material characteristics, dimensions and tolerances of the cross laminated timber elements not indicated in these Annexes are given in the technical documentation of the European technical assessment.

3.8 Design

The European Technical Assessment only applies to the manufacture and use of cross laminated timber elements. Verification of stability of the building while using the cross laminated timber elements is not subject of the European Technical Assessment.

The following conditions shall be observed:

- Design of the cross laminated timber elements is carried out under the responsibility of an engineer experienced in such products.
- Design of the works shall account for the protection of the cross laminated timber elements.
- The cross laminated timber elements are installed correctly.

Design of the cross laminated timber element can be performed according to EN 1995-1-1, taking into account Annexes 2 to 5 of the European Technical Assessment. Standards and regulations valid in the place of use shall be considered.

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the Decision 97/176/EC of the European Commission, as amended by 2001/596/EC, the system of assessment and verification of constancy of performance (see Annex V to the regulation (EU) No 305/2011) is System 1.

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking

Issued in Copenhagen on 2021-05-25 by



Thomas Bruun
Managing Director, ETA-Danmark

Annex 1
Construction of the wood slab elements "Lignotrend LIGNO acoustic panels" (example)

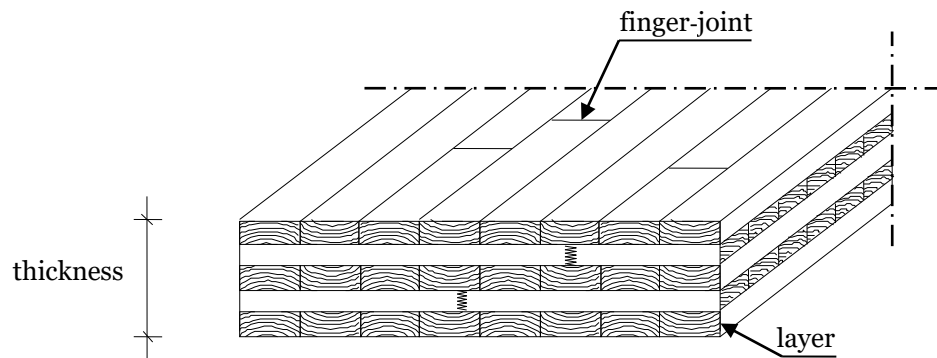


Figure 1: Principle structure of the cross laminated timber (five layers)

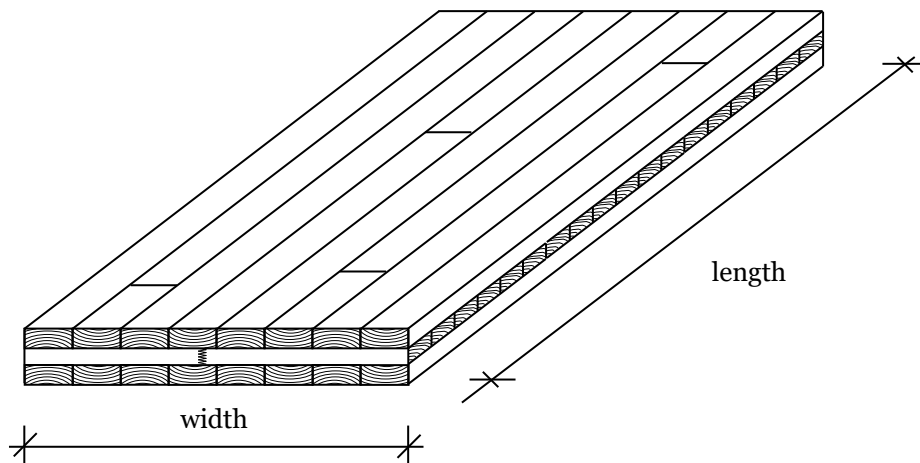


Figure 2: Principle cross laminated timber element (three layers)

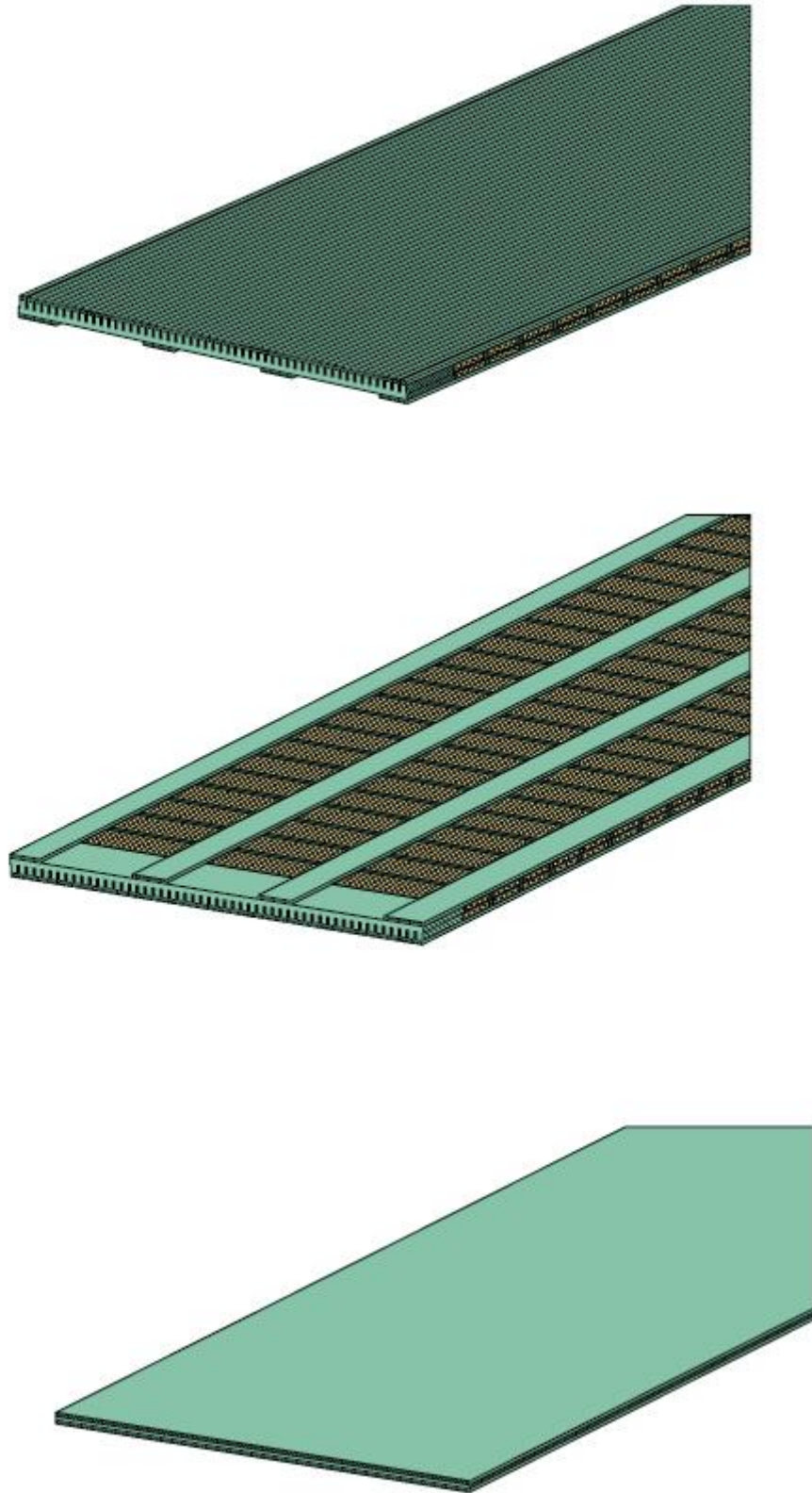


Figure 3 LIGNO Panels

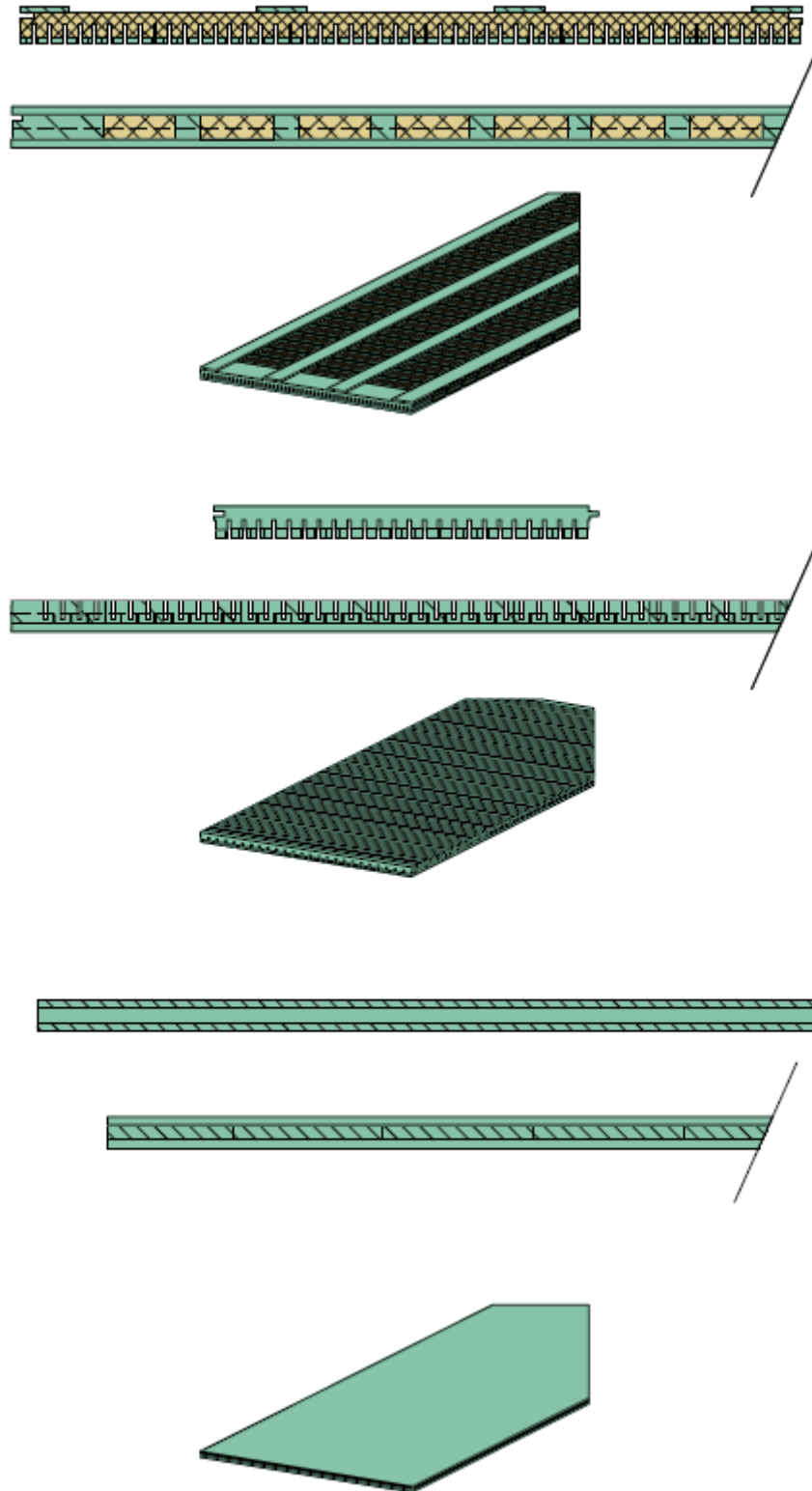


Figure 4 LIGNO Panels

Annex 2
Dimensions and specifications of the cross laminated timber

Characteristic	Dimensions and specifications
Cross laminated timber element	
Thickness	15 to 66 mm
Tolerance in thickness	± 1 mm
Width	≤ 1,25 m
Tolerance in width	± 1 mm
Length	≤ 8,00 m
Tolerance in length	± 3 mm
Number of layers	$2 \leq n \leq 6$
Maximum number of consecutive layers having the same grain direction	2
Maximum width of gaps between adjacent boards in longitudinal layers in cross layers	150 mm 68 mm
Boards	
Material	Softwood
Strength class according to EN 338	Not resawn or resawn non-load-bearing boards: C16, C24, C30
	Resawn and knot-free boards: ≥ C30 or D30
Thickness in longitudinal layers in cross layers	5 to 40 mm 5 to 40 mm
Width	10 to 68 mm
Ratio width to thickness of the cross-layer boards or strips	≥ 1:2
Moisture of wood according to EN 13183-2	8±2; 9±2, 10±2 Within one cross laminated timber element only one of the specified moisture ranges shall be applied
Finger joints	EN 14080

Annex 3
Essential Requirements of the cross laminated timber

ER	Requirement	Verification method	Class / Use category / value	
1	Mechanical resistance and stability			
	For the calculation the characteristic strength and stiffness values of glulam according to EN 14080 shall be used taking into consideration the definitions in annex 2. In addition, the following values apply:			
	Mechanical actions in plane of the cross laminated timber	Shear strength for the calculation with the gross cross section (5% - fractile)	$f_{v,k}$	as given in Annex 5
	Mechanical actions perpendicular to the cross laminated timber	Rolling shear strength (5% - fractile)	$f_{r,k}$	as given in Figure 3
		Rolling shear modulus (mean value)	$G_{r,mean}$	as given in Figure 4
	For references regarding the calculation see annexes 4 to 5. National regulations might have to be followed.			
	Use of fasteners	According to EN 1995-1-1		
	Creep and duration of load	According to EN 1995-1-1		
Dimensional stability	Moisture content during use shall not change to such extent that adverse deformations can occur.			
2	Behaviour in case of fire			
	Reaction to fire			
	Solid wood panels except for floorings	Commission Decision 2005/610/EC	Euroclass D-s2,d0	
	Floorings		Euroclass D _n -s1	
	Resistance to fire			
Charring rate	EN 1995-1-2	$\beta_0 = 0,65 \text{ mm/min}$ $\beta_n = 0,7 \text{ mm/min}$		
3	Hygiene, health and the environment			
	Vapour permeability μ	No performance assessed		
	Content of dangerous substances	EAD 130005-00-0340	See clause 3	
4	Safety in use			
	Impact resistance	Soft body resistance is assumed to be fulfilled for walls with a minimum of 3 layers and minimum thickness of 33 mm.		
5	Protection against noise			
	Airbourne sound insulation	No performance assessed		
	Impact sound insulation	No performance assessed		
	Sound absorption	No performance assessed		
6	Energy economy and heat retention			
	Thermal conductivity λ	No performance assessed		
	Air tightness	No performance assessed		
	Thermal inertia c_p	No performance assessed		

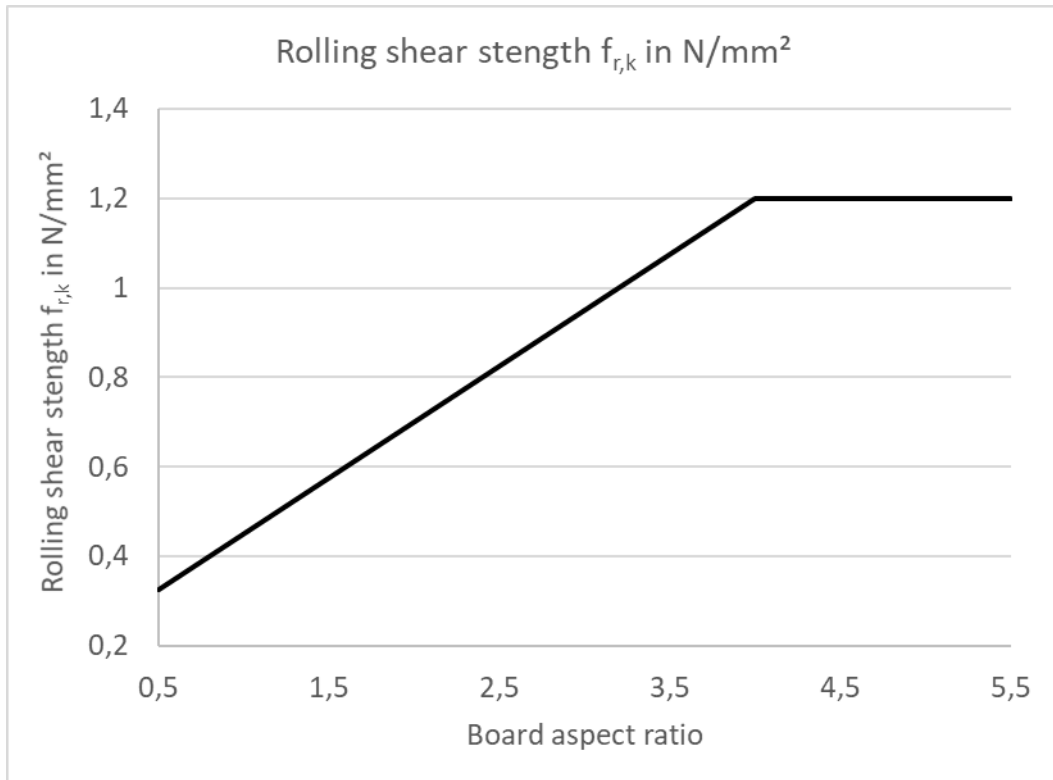


Figure 3: Rolling Shear Strength $f_{r,k}$

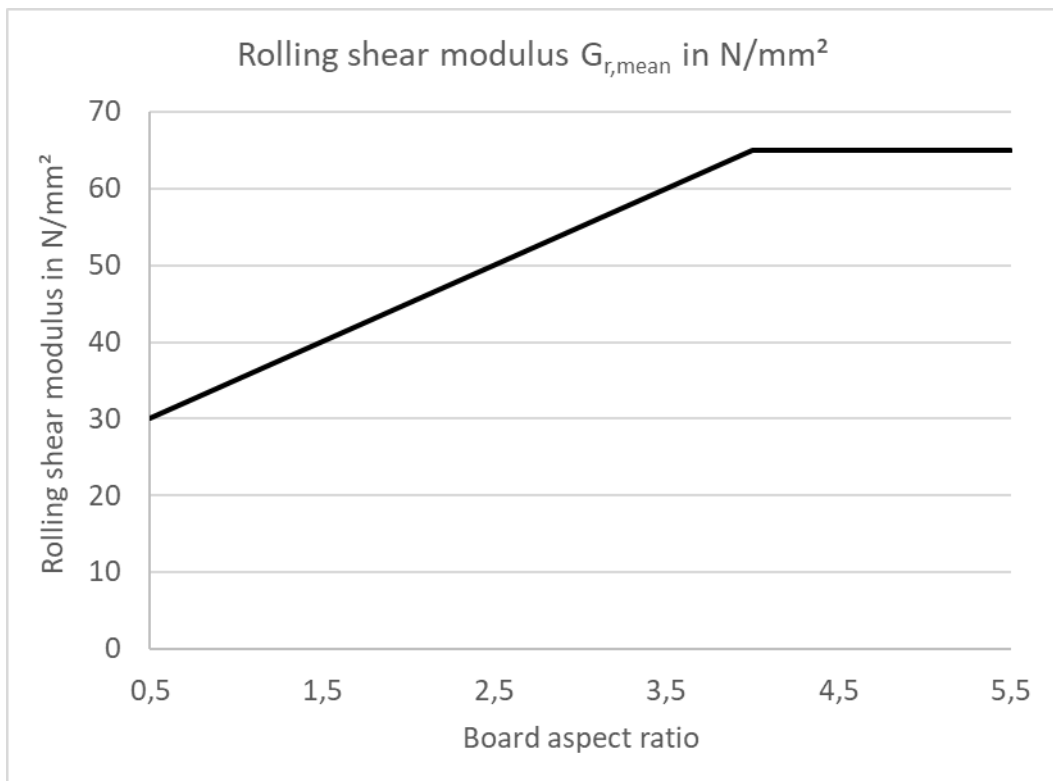


Figure 4: Rolling Shear Modulus $G_{r,mean}$

Annex 4

Design of the cross laminated timber

1 Mechanical actions perpendicular to the cross laminated timber

Stress distribution within the cross laminated timber has to be calculated taking into account the shear deformation of the cross layers.

For simply supported cross laminated timber elements with 3 layers the stress distribution may be calculated according to EN 1995-1-1 as mechanically jointed beam where the value s_i/K_i is substituted by $d_i/(G b_{ef})$ with d_i = thickness of the cross layer, G = shear modulus of the cross layer (see Figure 4) and b_{ef} = effective width of the cross layer.

$$b_{ef} = \frac{b \cdot b_q}{a_q}$$

with

b = cross layer width

b_q = cross board width

a_q = centre to centre cross board spacing

For the design of cross laminated timber, the characteristic strength and stiffness values shall be taken from Annex 3.

For the bending design only the stresses at the edges of the boards are decisive, axial stresses in the centre of the boards are not considered in the design.

Tension loads perpendicular to the element should be avoided.

2 Mechanical actions in plane of the cross laminated timber

Stress distribution within the element has to be calculated by taking into account only the boards which are oriented in the direction of the actions.

Shear stresses may be calculated with the total width of the cross laminated timber.

For the design of cross laminated timber elements made of layers of soft- or hardwood the characteristic strength and stiffness values of the layers shall be taken from Annex 3.

Annex 5

In plane shear strength of Lignotrend Akustik light

1 General

The design rules given in this section amend the design rules for shear design given in EN 1995-1-1.

1.1 In plane shear strength of elements with continuous, edge glued layers

The shear capacity shall be based only on the accumulated capacity of the continuous, edge glued layers. Layers with gaps in between the boards within a layer shall be disregarded when determining the in plane shear capacity.

1.2 In plane shear strength of elements without continuous, edge glued layers

The shear capacity shall be based on the gross cross section of the Lignotrend LIGNO acoustic panels and the characteristic shear strength $f_{v,k}$ given in equation (1).

$$f_{v,k} = \min \left\{ \begin{array}{l} 8,0 \cdot \frac{b_{net} \cdot h_{net}}{b \cdot h_{tot}} \\ 2,0 \cdot \frac{2 \cdot \sum I_p}{h_{tot} \cdot a_i} \end{array} \right\} \text{ in N/mm}^2 \quad (1)$$

Where

$$\sum I_p = \frac{b_q}{12 \cdot a_q} \cdot \left[\frac{b_{1l}}{a_{1l}} \cdot (b_{1l}^2 + b_q^2) + \frac{b_{2l}}{a_{2l}} \cdot (b_{2l}^2 + b_q^2) \right]$$

b_{net} = Sum of longitudinal or cross board widths within element width b in mm

h_{net} = Sum of longitudinal or cross board thicknesses in the element in mm

$b_{net} \cdot h_{net}$ = Smaller product of b_{net} and h_{net} of longitudinal or cross layers, respectively, in mm²

b = Element width in mm

h_{tot} = Element thickness in mm

a_q = Centre to centre spacing of cross layer boards in mm

b_q = Width of cross layer boards in mm

a_{1l} = Centre to centre spacing of longitudinal layer 1 boards in mm

b_{1l} = Width of longitudinal layer 1 boards in mm

a_{2l} = Centre to centre spacing of longitudinal layer 2 boards in mm

b_{2l} = Width of longitudinal layer 2 boards in mm

a_i = $\max\{b_q; b_{1l}; b_{2l}\}$

$$\sum I_p = \frac{b_q}{12 \cdot a_q} \cdot \left[\frac{b_{1l}}{a_{1l}} \cdot (b_{1l}^2 + b_q^2) + \frac{b_{2l}}{a_{2l}} \cdot (b_{2l}^2 + b_q^2) \right]$$